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SLOPELAND FARMS IN GREEN

by: Liao, Mien-chun / Wu, Huei-long



Chinese Soil and Water Conservation Society R.O.C.

RESTORATION OF VEGETATION ON SLOPELANDS

Large areas of slopelands were originally covered by forests and diversified plants, providing a living environment for human beings and wildlife.

In recent decades, slopelands in Taiwan have come to a crisis as a result of illegal occupancy, careless construction and destruction excavation. Trees were cut and vegetative cover destroyed. Soils were eroded and thus lost their water storage capacity. Gullies, landslides and land creep occurred very often. Because most slopelands are steep and few buffer areas exist, soils, gravels and stones rush down, bringing about tremendous dangers and hazards in the flat areas. Even a rather heavy rain would give rise to a disaster. The situation deteriorated steadily year by year.

To cope with the above-mentioned situation, an integrated soil conservation program has been implemented for sloping farm land. Besides investigation and planning, which is characterized with an emphasis on rational land use, a technical system for rehabilitation and greening of slopeland farms has been worked out. The feature of the system is to use grasses for establishing an overall cover of the farmland. Consequently, not only have the soil and water losses been economically checked and soil stability secured, but also the water running down-slope has become cleaner and the problem of sedimentation in down-stream areas has been partially sloved.

When the soil of slopeland farms are covered by vegetation, there comes a stage of conservation with non-tillage and no-weeding. It also turns the farmland into a full green landscape for which ecologists are hoping day in and day out.

It is on the basis of rehabilitation and greening that we could achieve both better land conservation and better land use. So, soil conservation is compatible with the land use. Moreover, the green resources of slopeland could be thus restored. As the green and vegetation resources increase quantitatively and qualitatively the ecosystem could be maintained. This is the ultimate objective of agricultural landscape greening.

Slopeland farming is one part of the environment in Taiwan. This pamphlet gives illustrations about the greenification of slopeland farms. Efforts are being made to conserve forests and shrubs for creating the favorable habitats for wildlife and providing shade, wind-breaks, and water conservation for better as it is.

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Mien-chun Liao
Counsellor, Council of Agriculture
Huei-long Wu
Senior Specialist, Council of Agriculture

VEGETATION ON BENCH TERRACES



◀ Bench terrace, a common soil conservation practice in many countries, was mostly used in Taiwan in the early 1950's.



◀ Field experiments proved that bahia grass (*Paspalum notatum*) was a good material for stabilization of the terrace wall. In terms of reducing soil and water losses, the bahia grass is excellent.

Growing bahia grass on bench terraces has been practiced for many years, and enhances the green vegetative resources on slope land. ▶



Good vegetative cover appears in the tea plantation with the terrace walls planted to grasses. ▶



VEGETATION ON MODIFIED BENCH TERRACE

The ordinary bench terrace built in the orchard has no room for machinery operation. After modification of bench terrace by opening a farming path midway in the terrace wall machinery can work on the farming path which is vegetated with grasses planted thereon.



VEGETATION ON NEWLY-DEVELOPED HILLSIDE DITCHES



◀ The original hillside ditch was one soil conservation practice used in the U.S.A. The first author modified it into a new type of hillside ditch which can serve as a farming path as well as a drainage ditch.

Through long-time experiments and large-scale application, bahia grass proved to be very effective in stabilizing the side slopes and bottom of hillside ditch. ▶



▲ Hillside ditch planted to grass is good for the movement of vehicle-type sprayer.



▲ Vehicle-type sprayer moves on hillside ditch, planted to bahia grass.

PLANT DEVELOPMENT ON HILLSIDE DITCHES

Bahia grass development after planting for about one month. ▶



◀ Bahia grass forms a dense cover on a hillside ditch.

A hillside ditch is stabilized and covered with a thick growth of bahia grass. ▶



◀ A citrus orchard in full cover.

MAJOR CROPS AND VEGETATION ON SLOPELANDS

Green cover in mulberry plantation. ►



◄ Grass cover in a passion fruit orchard.

Green cover between rows in pomelo orchard. ►



◄ Well-developed cover in a sloping pear orchard.



This tea plantation looks like a green carpet. ►



▲ Grass cover and mulching in alternative rows of a mulberry plantation.



▲ Bahia grass grows like green carpet in vineyard.



◀ This pineapple plantation appears in full green.

VEGETATION PLANTING ON TEA PLANTATIONS



◀ In tea plantations in the Lung-Tang area, terrace walls were all planted to bahia grass and the tea quality was upgraded, thus considerably increasing the tea value.



▲ Growing bahia grass between tea rows has become a welcome practice to a lot of tea farmers.

HILLSIDE DITCHES PLAY A KEY ROLE IN THE REVEGETATION AND GREENING OF SLOPELAND FARMS

Hillside ditching, one new soil conservation practice, plays the important role in the vegetation of slopeland farms. Having grown bahia grass on hillside ditches and side slopes, no weeding and no herbicides are needed, thereby preventing soil from being polluted.



The crossing paths between hillside ditches are called link roads, which connect the adjacent hillside ditches on both ends. ►



PROCESS FOR REVEGETATION OF HILLSIDE DITCHES

This slopeland orchard treated with hillside ditching turns into green under the cover of bahia grass.

The appearance of the slopeland orchard before treatment. ►



The slopeland orchard shortly after building hillside ditches and planting bahia grass. ►



The orchard became fully vegetated six months after grass planting. ►



COMPONENTS OF SLOPELAND FARM REVEGETATION-FARM ROAD NETWORK

Slopedland farms need sufficient roads to support the machinery operations. The crossing roads between hillside ditches are link roads on which planting grasses prevents erosion with reduced maintenance cost and improves the appearance of the road.



◀ The grassed link roads in a tea plantation.



◀ The grassed link road in a citrus orchard.



◀ Farm road network in slopedland.

REVEGETATION FOR FARM ROADS



◀ Farm roads and side slopes sustained permanent stabilization when planted to bahia grass. The grass could rejuvenate, if damaged, to maintain the ever green cover.

Grass planting, combined with stake setting on side slopes of the farm road contributes a lot of the side-slope stabilization. ▶



◀ Grass cover reduces much maintenance cost in side-slope stabilization. The green scene alongside the farm roads upgrades the engineering quality.



COMPONENTS OF SLOPELAND FARM REVEGETATION-GRASSED WATERWAYS

In the past, brick-laid and prefabricated cement chutes were used mostly for drainage on slopeland farms. The grassed waterway, originally developed for moderate slopes in the U.S.A., has been used successfully on steep slopes in Taiwan.



▲ Planting grasses in the waterway not only facilitates the drainage economically, but also gives the farm green-like appearance.

◀ One drainage experiment, using dye tracers, being conducted in the grassed waterway.

The grassed waterway, one important greening component, has been widely used on slopeland farms to the satisfaction of the farmers. ►



COMPONENTS OF SLOPELAND FARM REVEGETATION-STRUCTURAL PROTECTION



Planting grasses on both sides of a brick-laid chute helps stabilize the chute structure.



Planting grasses on both sides of the drainage structure helps stabilize the structure and adds more green cover to the farm.

GULLY CONTROL AND REVEGETATION

Many gullies develop in the slopeland farms when soil conservation treatments are not adequate. For efficient gully control, the principal method is to use revegetation and greening practices supplemented by temporary structures.

The rough surface first was smoothed and then planted to grasses. A single-fence check dam was constructed in the gully. ►



◀ After cover had been established, soil conservation practices were applied on the upstream channel. In doing so, the gully became stabilized and the aim of slopeland conservation and greening achieved.

A series of drop structures under construction for gully control. ►



◀ After the gully is controlled and planted to grasses, it becomes a grassed waterway, making a beautiful green scene.



◀ After grading both sides of the gully, stakes were set and straw bundles buried. Gabion dams were built as the mechanical treatment.

The gully has been stabilized and nearly revegetated with bahia grass one year afterward. ►



BREIF INTRODUCTION TO EXPER



◀ Valuable plant materials were selected from hundreds of grass species through some thirty years of experiments.



◀ Experimental plots compare different methods for establishing bahia grass cover.



◀ A series of experiments proved that bahia grass was the best among other cover crops. The plots show different planting methods of bahia grass in citrus orchard.

MENTS ON REVEGETATION

Soil collection boxes show that a very small amount of soil was eroded in one year by runoff on an experimental plot. ►



◀ This photo shows the amount of soil accumulated in the collection tanks. The right plot with no cover appeared to be seriously eroded, while the left plot with grass cover showed so little erosion that the water collected was small in amount and clear in color.



ADDRESS: NO. 8-1, LANE 113, HSIA-MEN S
TAIPEI, TAIWAN, R. O. C.
TEL: (02)3918532

